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However, the differences between the relevant portions of Dr. Wegener's map and the evidently more correct delineations on the recent charts of the Hydrographic Office affect only a relatively small part of the area considered and, therefore, need not be taken as a criterion for an unfavorable judgment of the remainder of his work. These differences should rather, as has been the aim of the above lines, emphasize the urgent necessity of a thorough general resurvey of all the Samoan Islands belonging to the United States.

W. L. G. J.

INSTRUCTION IN GEOGRAPHICAL SURVEYING

BY

I. N. DRACOPOLI

With the exception of the Royal Geographical Society of London, there is perhaps no school or college in English speaking countries where a private person may obtain efficient tuition in geographical surveying. The ordinary land surveyor cannot give adequate instruction, for astronomical observations have no part in his line of work and his methods are cumbersome and unsuitable when applied to large areas. It was to supply this need that the Council of the Royal Geographical Society appointed an instructor, Mr. E. A. Reeves, in surveying and map-making and arranged a course of work, which, when mastered, enables an explorer to profit by all his opportunities and to make as accurate and complete a survey as his time and means allow. The following is an outline of the work required:

Practical Astronomy. (*a*) Latitude.—Observations with the sextant and theodolite, including the adjustments, and finding index and level error. Computation of latitude by meridian altitudes of sun and stars, by circum-meridional altitudes, by Polaris and double altitudes. (*b*) Longitude and Time.—Observations with sextant and theodolite, and computations for finding local time by sun and stars, and thence the longitude; equal altitudes of the sun and stars for finding error and rate of watch. Telegraphic determinations of difference of longitude. Longitude by occultations of stars by the moon, and the prediction of the circumstances of occultations; longitude by meridian distances. The principle of longitude by moon culminating stars by eclipses of Jupiter's satellites and lunar distances; (*c*) Azimuths.—Azimuth by star and sun, theodolite and sextant observations. Error of compass from the observed bearing of the sun and the computed true bearing of the sun.

Surveying. Triangulating and traversing with theodolite with their adjustments. Measurement of base-line. Latitude and Azimuth Traverses. Geodetic Latitudes and Longitudes. Astronomical Base-line. Computing the position of distant points observed with theodolite from the ends of a base-line, and plotting the same on projected plane-table sheet. Plane-table surveying, including different methods of orienting the table, finding position and continuing survey from points previously fixed by triangulation. Tacheometer surveying and finding the value of divisions of micrometer. Route surveying with prismatic compass. Keeping the field-book. Levelling and computation of heights from observed vertical angles, allowing for curvature and refraction, from barometer and boiling-point observations. Contouring, drawing contour lines, and vertical sections from them. Principle of photographic surveying.

Map Projections, Plotting and Map Drawing. Construction of the more useful map-projections, including the investigation of their principles. Plotting surveys from field-books. Map drawing with special reference to the delineation of topographical features. Scales of maps, and the construction of diagonal and other scales.

The student, at his examination, is required to produce maps plotted and drawn by himself entirely from his own surveys in which he has used all the instruments mentioned above, and to show specimens of drawings of different topographical features. These maps are generally three in number, one on the scale of 1 : 125,000 of a piece of country half a degree square, with contour lines at intervals of 200 feet; one on the scale of 1 : 5,000 of some small range of hills, with contour lines at intervals of four feet; and one a large scale map of some section of a town. The candidate must show all his notes and his observations, and unless these maps are satisfactory he will not be allowed to present himself for the final and oral examination. At the latter, he is expected to answer questions asked by the committee on any of the subjects here mentioned. He is also required to produce at least one example of each of the astronomical observations referred to above, taken and computed by himself, and to draw the geometrical figure representing each case to show that he has an intelligent understanding of the subject. If desired, he will in the presence of the committee take an observation and compute the result. The time devoted to each subject must vary according to the individual capacity of the student and other circumstances, but before presenting himself for examination he is kept at each subject until he understands it and has done the practical work required.

Courses in geology, botany, zoology, anthropological measurements, photography and meteorology, also give explorers careful training in these phases of field work. All lessons are given at sixty cents an hour.

The intending traveler may thus prepare himself thoroughly to profit by any opportunities he may meet at a very moderate cost. Many eminent explorers have been pupils of Mr. Reeves, among them, Mr. Shackleton, Mr. Boyd Alexander, famous for his journey from the Niger to the Nile, Mr. Douglas Carruthers, well known for his work in Asia and Arabia, and Major Fawcett, who has been exploring the region around the Heath River in South America. This effort by the Royal Geographical Society to help explorers has been most successful, judged by its results, and might with advantage be imitated by the geographical societies of other countries.

THE SWEDISH SOUTH POLAR EXPEDITION*

A REVIEW

This initial number of the scientific reports of the Swedish Antarctic Expedition, though it appears subsequently to the issue of a considerable number of parts devoted to specialized topics, furnishes the commander's general summary of geographical discoveries, combined with a report upon the morphology, glaciology, and regional geology. These subjects, though covered with some fullness, are yet regarded as summaries which are to be followed by more detailed studies.

Some knowledge of the wealth of scientific results which the Swedish expedition has furnished has already been acquired from the published popular narrative of the expedition (already in several languages), from Nordenskiöld's "Die Polarwelt," as well as from numerous papers which the commander has published in scientific journals.

After a condensed narrative of the expedition, there follows a critical résumé of earlier expeditions into the same region. The "Morrell Land" which was entered upon the map of the late Scotch Antarctic Expedition as lying to the eastward of King Oscar Coast, Nordenskiöld shows to have no existence, and severely scores Captain Bruce for rehabilitating this supposed land mass without observations to prove its existence. He also lends the weight of his au-

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* Die Schwedische Südpolar-Expedition und ihre geographische Tätigkeit. Von Otto Nordenskjöld. *Wissensch. Ergebnisse der Schwed. Südpolar-Exped. 1901-1903*, Bd. 1, Lief. 1, 232 pp. Maps, ills. Lithogr. Inst. des Generalstabs, Stockholm, 1911. Mks. 24. 11 x 8½.